1.0 Introduction

1.1 Background

LANL established guidance for occupational radiation protection in the radiation protection series LIGs (LIG 402-7xx-xx.x series) originally issued March 6, 1998. This LIG consolidates the guidance originally found in the radiation protection LIGs into one integrated document. This LIG complements LIR402-700-01, Occupational Radiation Protection Requirements.

This LIG becomes effective on the date of issue.

This LIG replaces the following documents:

- LIG402-703-01.1, Area Designations
- LIG402-704-01.1, Contamination Control
- LIG402-705-01.1, Radiological Design and Control
- LIG402-712-01.0, Radiological Posting
- LIG402-718-01.1, Radiological Training

1.2 In this Document

2.0 Purpose

The purpose of this LIG is to provide organizations and subcontractors with occupational radiation protection program guidance, including recommended practices that will enhance existing radiation protection programs.

3.0 Scope and Applicability

This LIG provides guidance for the conduct of radiological activities at all LANL facilities except those at the Nevada Test Site (NTS). NTS has established its own radiological control program to ensure consistent, high-quality radiological controls for all user organizations at the site. This LIG applies to LANL (UC) employees, contractors and subcontractors (e.g., maintenance subcontractors), visiting scientists, DOE or Department of Defense personnel, members of the public, and any other personnel who perform work at LANL or visit LANL in an official capacity.

4.0 Definitions

Definitions are found in Attachment U of LIR402-700-01, Occupational Radiation Protection Requirements.

5.0 Precautions and Limitations

None

6.0 Implementation Guidance

Implementation guidance specific to each of the occupational radiation protection programs is found in Attachments A through O of this LIG. Each attachment represents a chapter of the LANL occupational radiation protection program guidance document. For example, Attachment D is Chapter 4 of the document that provides guidance specific to dose standards.

7.0 Documentation

Record keeping guidance is found in Attachment T of this LIG (Chapter 20). Record keeping requirements are found in Attachment T of LIR402-700-01 (Chapter 20).

8.0 References

Document Ownership– The Office of Institutional Coordination for this document is ESH-RPO, Radiation Protection Office, 667-5296.

Directory of Resources
10 CFR, Part 835, Occupational Radiation Protection, amended November 4, 1998.
10 CFR, Part 830.120, Quality Assurance.
LPR402-00-00, Worker Health and Safety.
LIR402-700-01, Occupational Radiation Protection Requirements.

9.0 Attachments

Attachment A	Chapter 1	(Reserved as a placeholder)
Attachment B	Chapter 2	(Reserved as a placeholder)
Attachment C	Chapter 3	(Reserved as a placeholder)
Attachment D	Chapter 4	Dose Standards
Attachment E	Chapter 5	Personnel Dosimetry
Attachment F	Chapter 6	Workplace Monitoring
Attachment G	Chapter 7	Area Designations and Posting
Attachment H	Chapter 8	Radiological Training and Qualifications
Attachment I	Chapter 9	Access Control
Attachment J	Chapter 10	Personal Protective Equipment
Attachment K	Chapter 11	Work Planning
Attachment L	Chapter 12	Radiological Design and Control
Attachment M	Chapter 13	Radiation Protection Instrumentation
Attachment N	Chapter 14	Contamination Control
Attachment O	Chapter 15	(Reserved as a placeholder)
Attachment P	Chapter 16	Radioactive Sealed Source Accountability and Control
Attachment Q	Chapter 17	Labeling, Storing, and Receiving Radioactive Material
Attachment R	Chapter 18	(Reserved as a placeholder)
Attachment S	Chapter 19	Performance Assurance
Attachment T	Chapter 20	Records and Reports
Attachment U		LANL Radiological Control Organization

OCCUPATIONAL RADIATION PROTECTION REQUIREMENTS

Los Alamos National Laboratory
Laboratory Implementation Requirement LIR402-700-01.0
Original Issue Date: December 22, 2000 Mandatory

1.0 Introduction

Click here to see lessons learned that may apply to the requirements in this LIR.

1.1 Background

Los Alamos National Laboratory established basic standards and requirements for occupational radiation protection in the radiation protection series of LPRs (Laboratory Performance Requirements) and LIRs (Laboratory Implementation Requirements) (LPR402-7**xx.x** and LIR402-7**xx-xx.x** series) originally issued March 6, 1998. The LPRs were developed as part of the DOE Work Smart Standards Process. This LIR consolidates the requirements originally found in the radiation protection LPRs and LIRs into one integrated document. It also incorporates the requirements of the amended 10 CFR Part 835 rule dated November 4, 1998, which will be cited throughout this document.

This LIR complements LPR402-00-00.0, "Worker Health and Safety." Appendix 13 of LPR402-00-00 contains the radiation protection standards originally specified in the LPRs.

How to Use this Document

Each attachment to this LIR represents a chapter of the Laboratory's *Occupational Radiation Protection Requirements Manual* that shall be implemented. For example, Attachment A is Chapter 1 of the manual, which provides requirements that shall be implemented specific to radiation hazard communications. Each chapter is divided into parts, which are subdivided into articles. For example, the number 521 means chapter 5, part 2, article 1. In addition, each 10 CFR 835 requirement or derived requirement is followed by the section number in brackets (for example, [see 835.104]).

Note that in referring to tables, the first digit refers to the chapter where the table can be found, and the second digit designates the order of tables in the chapter (Table 4-1 is the first table in chapter 4, for example). Chapter 1 is Attachment A, chapter 2 is B, and so on.

This LIR shall be effective on the date of issue and shall be fully implemented within 90 days of issue. It replaces the following documents:

Laboratory Performance Requirements

LPR402-701.0 Access Control
LPR402-702.0 ALARA
LPR402-703.0 Area Designations
LPR402-704.0 Contamination Control
LPR402-705.0 Radiological Design and Control
LPR402-706.0 Personnel Dosimetry
LPR402-707.0 Emergency Exposures
LPR402-708.0 Instrumentation
LPR402-709.0 Performance Assessment
LPR402-710.1 Personal Protective Equipment
LPR402-711.0 Planned Special Exposures
LPR402-712.0 Posting
LPR402-713.0 Radiation Hazard Communication
LPR402-714.0 Occupational Dose Limits
LPR402-715.0 Records
LPR402-716.0 Source Control
LPR402-717.0 Storage and Labeling
LPR402-718.0 Training
LPR402-719.0 Workplace Monitoring
LPR402-720.0 Work Planning

Laboratory Procedures/Standards/Manuals

LS107-19.0 Fetal Radiation Protection
LM107-01.1 LANL Radiological Control Manual

Laboratory Implementation Requirements

LIR402-701-01.2 Radiological Access Control
LIR402-702-01.1 ALARA
LIR402-704-01.2 Contamination Control
LIR402-705-01.0 Radiological Design and Control Review
LIR402-706-01.1 Personnel Dosimetry
LIR402-708-01.1 Radiation Instrumentation
LIR402-710-01.2 Radiological Personal Protective Equipment
LIR402-711-01.1 Planned Special Exposures
LIR402-712-01.1 Radiological Posting
LIR402-713-01.1 Radiation Hazard Communication
LIR402-716-01.1 Source Control
LIR402-718-01.1 Radiological Training
LIR402-719-01.1 Workplace Monitoring
LIR402-720-01.1 Work Planning
LIR402-721-01.0 X-Ray-Generating Devices/Facilities

Guidance Note: The "Recommended Major Implementation Criteria for Self-Assessment (Guidance)" may be found at the end of each attachment (A through T) of this LIR.

1.2 In This Document

2.0 Purpose

This LIR specifies occupational radiation protection program requirements that shall be implemented for Laboratory organizations and subcontractors.

3.0 Scope and Applicability

This LIR shall establish requirements for conducting radiological activities at all Los Alamos facilities except those at the Nevada Test Site (NTS). **Guidance Note**: NTS has established its own radiological control program to ensure consistent, high-quality radiological controls for all user organizations at the site.

This LIR shall apply to Los Alamos (University of California) employees, contractors, subcontractors (for example, maintenance subcontractors), visiting scientists, DOE or Department of Defense personnel, members of the public, and any other personnel who perform work at the Laboratory or visit the Laboratory in an official capacity.

This LIR does not address requirements that are specific to the detailed operations of the radiation protection organization (for example, how to perform area contamination surveys); those requirements shall be implemented through ESH-1 (Health Physics Operations), ESH-4 (Health Physics Measurements), ESH-12 (Radiation Protection Services), and ESH-13 (ES&H Training) internal documents.

4.0 Glossary

Acronyms and special terms used in this document are defined in Attachment U.

5.0 Precautions and Limitations

5.1 Precautions

Guidance Note: Failing to follow the requirements of this LIR may result in excessive personnel doses, as well as the spread of contamination beyond intended boundaries. Such failure could also lead to a "noncompliance" with the Los Alamos National Laboratory 10 CFR 835, "Radiation Protection Program" (RPP document), resulting in enforcement actions that could be taken by DOE/EH-10, DOE's Office of Enforcement and Investigation.

5.2 When Requirements Do Not Apply

Except for maintaining individual doses within the limits specified in Table 4-1, chapter 4 (not including planned special exposures and authorized emergency exposures) [see 835.1(c)], the requirements of this LIR shall *not* apply in the following situations:

a. activities that are regulated through a license by the Nuclear Regulatory Commission (NRC) or a state that has an agreement with the NRC, including activities certified by the NRC under section 1701 of the Atomic Energy Act, except as noted in chapters 16 and 18 (Attachments P and R);
b. activities that are conducted under the authority of the director of the Naval Nuclear Propulsion Program, as described in Pub. L. 98-525;
c. activities conducted under the Nuclear Explosives and Weapons Surety Program relating to the prevention of accidental or unauthorized nuclear detonations;
d. radioactive material transportation as defined in this LIR (see Glossary);
e. DOE activities conducted outside the United States on territory that is under the jurisdiction of a foreign government to the extent governed by occupational radiation protection requirements agreed to by the United States and that foreign government; or
f. background radiation, radiation doses received as a patient for the purposes of medical diagnosis or therapy, or radiation doses received from participation as a subject in medical research programs (see Table 4-1, Note 3).

6.0 Implementation Requirements

Requirements that shall be implemented specific to each of the occupational radiation protection programs are located in Attachments A through T of this LIR.

6.1 Integrated Safety Management (ISM) Requirements

The five-step process of integrated safety management must be applied to all aspects of radiological work. Implementing this LIR shall invoke the five-step process. **Guidance Note**: Further information regarding integrated safety management and the five-step process may be found in LPR300-00-00, "Integrated Safety Management."

6.2 Quality Assurance Requirements

Each radiological facility or activity must meet the requirements of LPR308-00-00, "Quality," for radiological work. The ten quality criteria listed in this LPR must be implemented in a graded approach, commensurate with the hazard level (see Article 312 in chapter 3).

6.3 General Requirements

Trained individuals must recognize that their actions directly affect contamination control, personnel radiation exposure, and the overall radiological environment associated with their work. The following basic radiological control requirements shall apply to each individual in the workplace.

6.3.1 All employees shall do the following:

- Obey posted, written, and oral radiological control signs, labels, and instructions; hazard control plans (HCPs); and procedures, including instructions on radiological work permits.
- Obey "evacuate" and "stop work" orders promptly, in accordance with facility- or organization-specific procedures.
- Wear personnel monitoring devices when required by radiological work permits, signs, procedures; or by radiological control personnel. Report immediately the loss, damage, or unexpected exposure of personnel monitoring devices or off-scale readings of self-reading dosimeters to ESH-1 (typically, the facility or area radiological control technician [RCT]).
- Participate in internal dosimetry programs as assigned.
- Keep track of their year-to-date radiation exposure status, as well as their external exposure during radiological activities when using direct-reading dosimetry devices.
- Wear personal protective equipment and clothing when required by radiological work permits, HCPs, other work control documents, or postings.

- Minimize the potential spread of radioactive spills and immediately notify ESH-1 (typically, the facility or area RCT) of all spills.
- Avoid contact of skin, clothing, and equipment with contaminated surfaces.
- Place contaminated tools, equipment, and solid waste items on disposable surfaces, such as plastic sheets, when not in use.
- Notify ESH-1 (typically, the facility or area RCT) of faulty radiological control equipment.
- Communicate to ESH-1 (typically, the facility or area RCT) and his or her safety- and environment-responsible line-management chain changes in work, processes, procedures, configurations, or controls that may affect radiological conditions of an operation or area.
- Notify the ESH-12 Radiation Information Management team of off-site occupational radiation exposures so that worker dosimetry records can be updated.
- Ensure that they are mentally alert and in physically sound condition for the work to be performed.
- Limit the amount of material or equipment taken into contaminated areas to minimize radioactive waste and future decontamination.
- Ensure that required materials and equipment are on hand to complete the assigned task, thereby minimizing time and exposure.
- Before entering an area where contamination might be present, ensure that Occupational Medicine (ESH-2) evaluates open wounds, sores, or rashes. If wounded while in this area, exit the area and report the wound to ESH-1 (typically, the facility or area RCT) immediately.

6.3.2 Upon leaving the area, individuals shall

- remove personal protective equipment and clothing to minimize the spread of contamination, and
- frisk or be frisked for contamination when exiting Contamination, High Contamination, Airborne Radioactivity Areas, Underground Radioactive Material Areas (URMAs), and disturbed Soil Contamination Areas; as well as associated Radiological Buffer Areas (RBAs) and Radiological Controlled Areas (RCAs); and immediately notify ESH-1 (typically, the facility or area RCT) if contamination is found.

6.3.3 Individuals shall not

- loiter in radiological areas or
- smoke, eat, drink, or chew in RCAs controlled for contamination, RBAs controlled for contamination, Contamination Areas, High Contamination Areas, Airborne Radioactivity Areas, URMAs, Soil Contamination Areas, and Radioactive Material Areas (unless exempted by facility-specific or job-specific requirements).

6.4 Specific Requirements

Specific requirements that shall be implemented are as follows:

Attachment A	Chapter 1	Radiation Hazard Communications
Attachment B	Chapter 2	Response to Radiological Emergencies and Incidents
Attachment C	Chapter 3	ALARA Program
Attachment D	Chapter 4	Dose Standards
Attachment E	Chapter 5	Personnel Dosimetry
Attachment F	Chapter 6	Workplace Monitoring
Attachment G	Chapter 7	Area Designations and Posting
Attachment H	Chapter 8	Radiological Training and Qualifications
Attachment I	Chapter 9	Access Control
Attachment J	Chapter 10	Personal Protective Equipment
Attachment K	Chapter 11	Work Planning
Attachment L	Chapter 12	Radiological Design and Control
Attachment M	Chapter 13	Radiation Protection Instrumentation
Attachment N	Chapter 14	Contamination Control
Attachment O	Chapter 15	External Exposure Control
Attachment P	Chapter 16	Radioactive Sealed Source Accountability and Control
Attachment Q	Chapter 17	Labeling, Storing, and Receiving Radioactive Material
Attachment R	Chapter 18	X-Ray Generating Devices and Facilities Control
Attachment S	Chapter 19	Performance Assurance
Attachment T	Chapter 20	Records and Reports
Attachment U	Glossary	Glossary

6.5 Monitoring Requirements

Monitoring requirements normally performed by Laboratory-qualified radiological control technicians (RCTs) shall be performed by other trained and qualified personnel only when a current Radiological Surveillance Authorization Agreement (RSAA) is in place or when approved by ESH-1 management. **Guidance Note**: Refer to ESH-1-01-03, "Radiological Surveillance Authorization Agreement" for further information regarding RSAAs.

7.0 Documentation

Chapter 20 of this LIR defines the record-keeping requirements that shall be implemented.

8.0 References

Document Ownership—The Office of Institutional Coordination for this document shall be ESH-RPO, the ESH Radiation Protection Office, 667-5296.

Directory of Resources

10 CFR, Part 835, "Occupational Radiation Protection," amended November 4, 1998
10 CFR, Part 830.120, "Quality Assurance"
DOE Order 414.1A, Quality Assurance
LPR402-00-00.0, "Worker Health and Safety"

9.0 Attachments

Attachment A	Chapter 1	Radiation Hazard Communications
Attachment B	Chapter 2	Responding to Radiological Emergencies and Incidents
Attachment C	Chapter 3	ALARA Program
Attachment D	Chapter 4	Dose Standards
Attachment E	Chapter 5	Personnel Dosimetry
Attachment F	Chapter 6	Workplace Monitoring
Attachment G	Chapter 7	Area Designations and Posting
Attachment H	Chapter 8	Radiological Training and Qualifications
Attachment I	Chapter 9	Access Control
Attachment J	Chapter 10	Personal Protective Equipment
Attachment K	Chapter 11	Work Planning
Attachment L	Chapter 12	Radiological Design and Control
Attachment M	Chapter 13	Radiation Protection Instrumentation
Attachment N	Chapter 14	Contamination Control
Attachment O	Chapter 15	External Exposure Control
Attachment P	Chapter 16	Radioactive Sealed Source Accountability and Control
Attachment Q	Chapter 17	Labeling, Storing, and Receiving Radioactive Material
Attachment R	Chapter 18	X-Ray-Generating Devices and Facilities Control
Attachment S	Chapter 19	Performance Assurance
Attachment T	Chapter 20	Records and Reports
Attachment U	Glossary	